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Decommissioning Waste: Why it Pays to Plan Ahead

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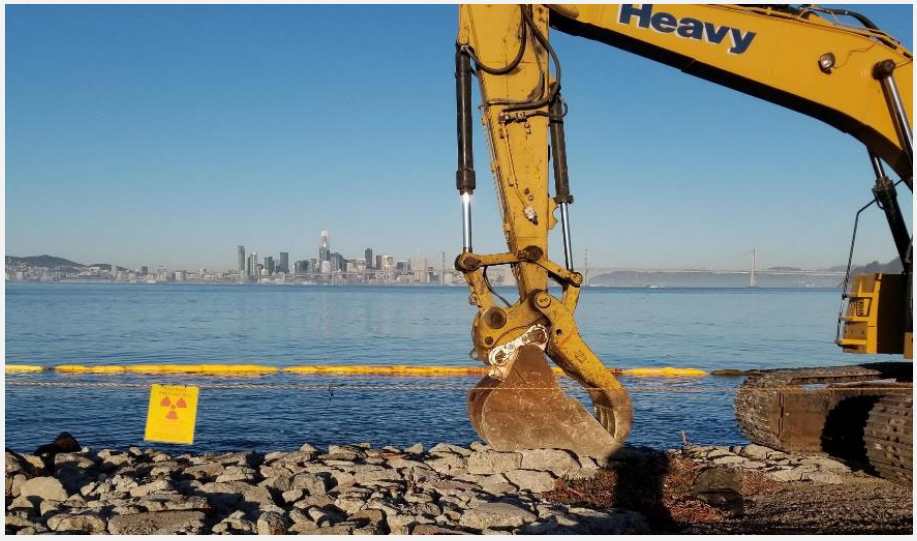
Speaker Bio

Ken Gavlik

- HPS Decommissioning Section - President
- NAC Philotechnics Vice President of Radiological Services
- US Navy Nuclear Power Program Submarine Veteran
- BS and MBA
- Approximately 3 decades of experience, having conducted in excess of 110 facility decommissioning, radiological release for unrestricted use, and radioactive materials license termination projects in the last decade.
- Shipped thousands of cubic yards and millions of pounds of radioactive waste.
- NYC Emergency Planning and Preparedness and Radiological Advisory Committee Subject Matter Expert.



Roadmap

The Issue

- Radioactive waste is a major driver in total decommissioning project costs.

Why is this an Issue

- Overview of Upfront and Total Waste Management

How to resolve Issue – Ways to Plan Ahead

- Total Waste Management Plan
- Better package efficiency = less costs associated with transport
- Better package density = less costs/volume of waste
- Higher density waste achieves best concentration average = lower costs for disposal
- Classify waste as exempt
- Ability for direct disposal as exempt or BSFR

Radioactive waste associated with decommissioning projects is normally the major driver in the total project cost and requires a best management approach to minimize waste disposal costs.

Imperative decommissioning contractors plan and incorporate waste management on the front-end as part of the total operational structure of a decommissioning project.

The entire decommissioning project performance is the sum of all its parts and must work in tandem to provide not only success, but also the most cost-effective approach.

Waste is a major, if not the most major, factor in the total project value and requires the best management approach to minimize costs.

When the contractor does not integrate waste, the best value is not realized. When the contractor does integrate waste substantial cost savings are realized.

Project Life-Cycle

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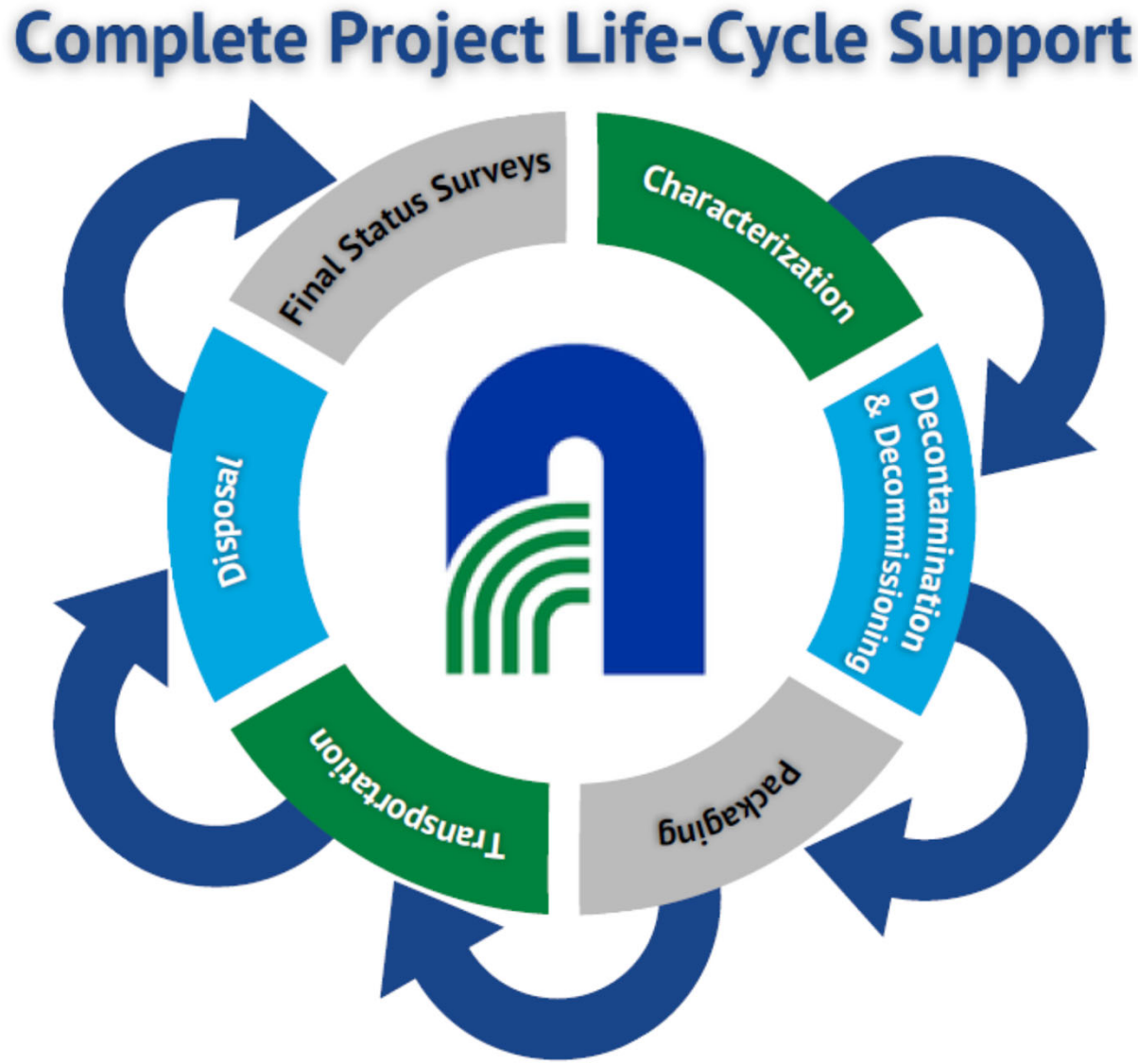


Project Life-Cycle

Project performance is the sum of its parts

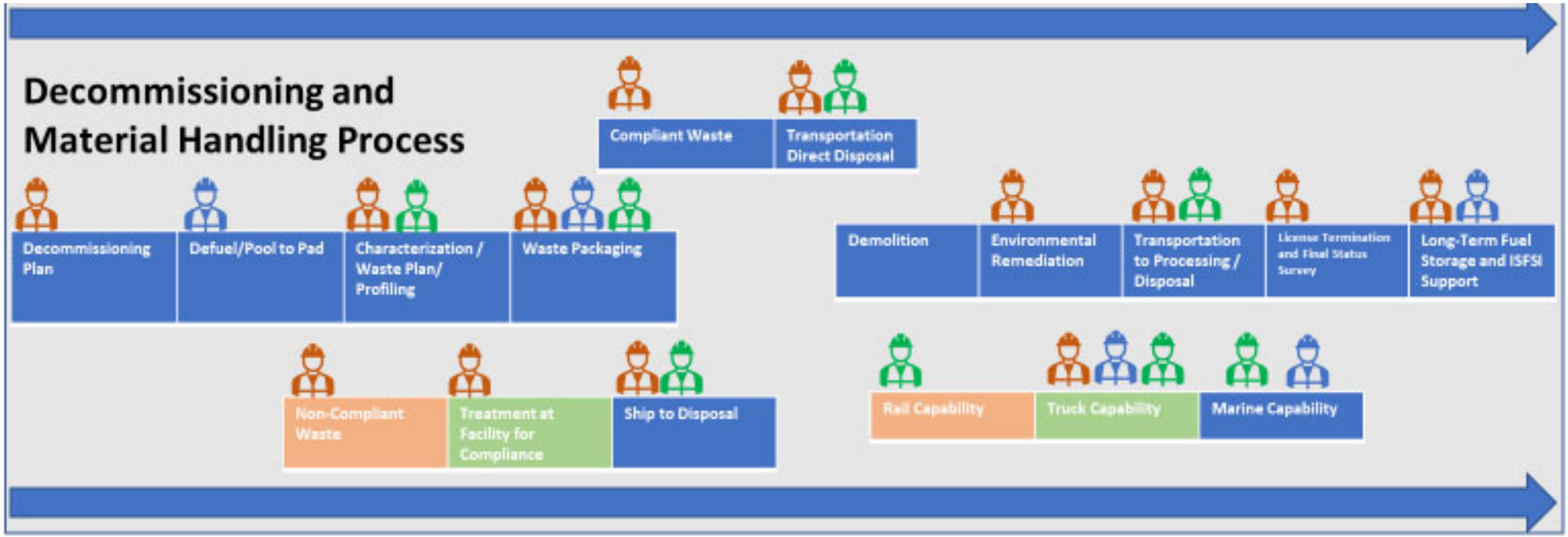
The Pathway to Lower Costs and Risks

FRONT END CHARACTERIZATION → INNOVATIVE WASTE MANAGEMENT → TARGETED REMEDIATION → CLIENT COST $AVINGS

A comprehensive project approach will lower the overall project cost and risk by investing in waste minimization measures up front.

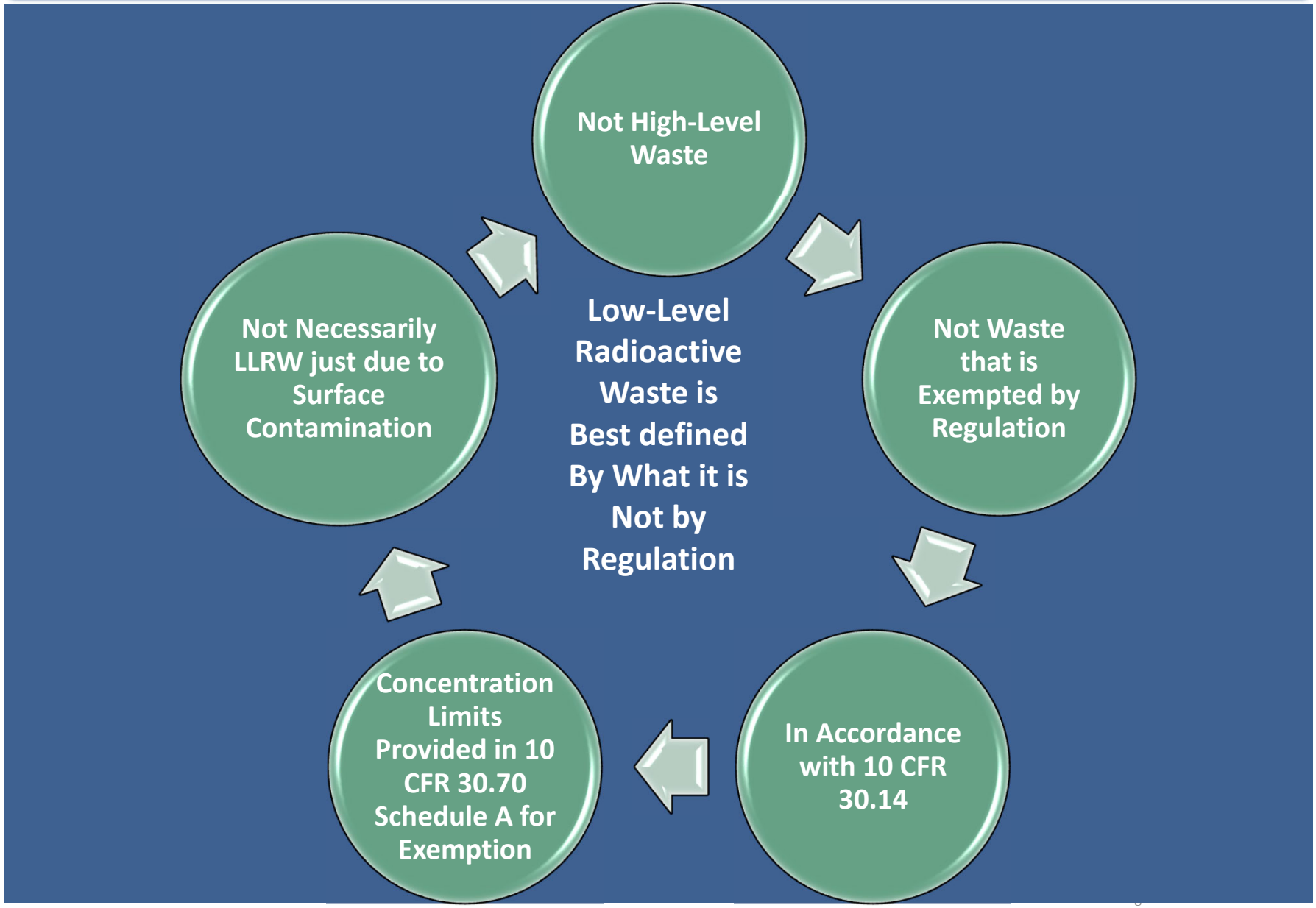
Project Life-Cycle

Efficient Processes



Why an Issue

Accuracy of the Waste Classification drives Costs!



Why an Issue

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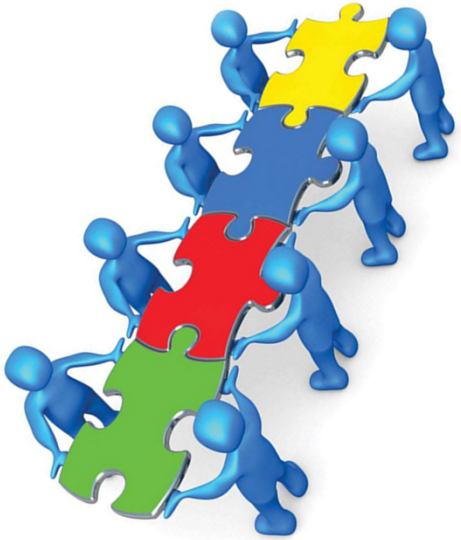
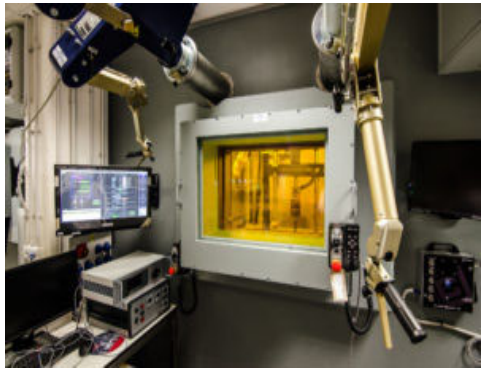
- Many decommissioning contractors will
  - Insufficiently characterize potential radioactive wastes
  - Utilize average or highest contamination levels and apply to total waste weight to determine total activity and activity concentrations – as it called throughout the industry, “Failing Safe or Conservative”.
  - Not use waste minimization and/or volume reduction techniques – i.e. dispose of everything rather than survey for release and/or recycle (this can be a cost savings as well to be discussed later).
  - Dispose of a per pound versus volume
  - Not maximize package volume
  - Not segregate
  - Utilize processor versus direct for disposal
  - Not take into account disposal location and/or turnaround times.

Upfront and Total Waste Management

- Proper planning to determine form, fit, and function
- Choose a radiological decommissioning firm or firm utilizing a teaming partner with extensive waste management experience for waste management from creation-to-package-to-transport-to-disposal
- Structure design parameters for success
- Develop best management approach to promote project goals and achieve overall best value
    - Proper characterization to accurately classify waste stream. Exempt, BSFR, or Class A, B, or C
    - Robust characterization to include extensive surveys, potential gamma-spectroscopy, and modeling to determine radionuclides and activity concentrations.
    - Determine waste material types and classification(s)
    - Does waste meet exemption criteria, or BSFR
    - Developing Radiological Work Procedures
    - Determine density of waste materials (Low/high)
- Based on data, Waste Acceptance Criteria, and location, designate disposal and transportation options.
- Determination for survey for free release/recycle, waste processing or direct for disposal





Resolution

Waste Processor

- Licensed to receive radioactive waste from various generators
- Perform specific activities to promote package efficiency.
- Ultimately sent to a disposal firm.
- Charge on a $$/lb. pricing basis.
- Requires receipt at elevated $$/lb. and packaged to achieve package density efficiency for profit.
- Middleman to perform what should be completed in field.

Waste Disposal Firm

- In comparison, the waste disposal firm is licensed to receive radioactive waste that is properly conditioned and packaged and simply dispose of the waste in accordance with their license conditions.
- Receive waste directly from generator
- Charge on a $$/Volume pricing basis.

Free Release/Recycle

- Can be conducted on or off site.
- Does it fit and are conditions favorable.
- Pricing based on labor to conduct versus $/lb ROI.
- Many entities now pushing free release and/or recycle to the degree possible.

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Waste Minimization

- Work Planned
- No Cross Contamination
- Cleaning and extra supplies will be maintained outside any potentially contaminated area to keep them clean and to minimize additional waste generation.
- Drop cloths or other absorbent material will be used to contain small spills or leaks.
- Mixing of detergents or solutions will be performed outside potentially contaminated areas.
- Stored in large containers, but the smallest reasonable container will be used to transport the material to the location of final disposition.
- Contaminated material will remain segregated from clean material.
- Material and equipment will be decontaminated and reused when practicable.
- Material segregation by type and composition.
- Only the size waste containers adequate to contain the volume of waste generated will be used.
- Waste containers will be inspected to ensure that they are solidly packed and free of void spaces to minimize the number of containers, and in a manner to achieve maximum density/volume efficiency to achieve volume versus per pound pricing.

Volume Reduction

- Size Reduction
- Compaction

Resolution

Packaging

- Appropriately sized
- Solidly packed
- Maximum density/volume
- Free of Void Space
- No liquids (Unless All Liquids)

Transportation

- Milk-Run
- Direct for Disposal
- Truck (Small/Large)
- Rail
- Marine

Example of Previous Cost Savings Realized

Per pound pricing eliminates the opportunity for on-site performance to for significant cost savings as previously noted

Example based purely on waste weight

40,000 lbs waste cost = $6.00/lb.

Ex. $6.00 / lb. x $40,000 lbs. = Price $240,000.00

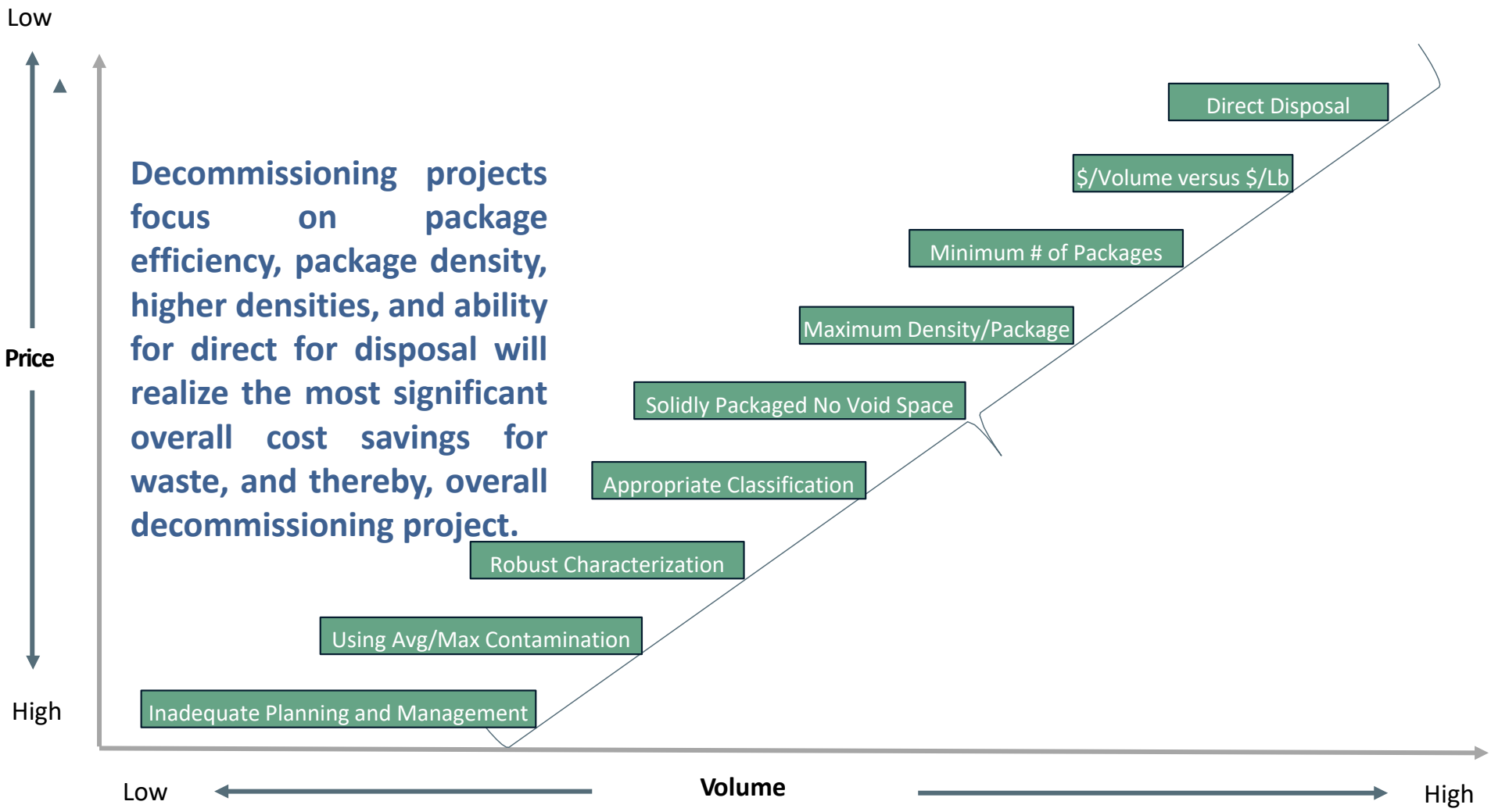
40,000 lbs: Achieving ~17 lbs./ft.3

- **Ex. 40,000 lbs. / 17 lbs./ft^3 = 2353 total ft^3 / 27 ft^3/yd^3 = ~87 yd^3**
- **87 yd^3 / 25.4 yd^3/container = ~4 containers x $16,000 / container = Price $64,000.00**

This represents a cost savings of $176,000.00 associated with $40,000 lbs. of waste. As the project waste increases the savings associated with this approach can be much more substantial to the overall project costs.

Results

Optimal Process for Overall Cost Savings



Realize Significant Cost Savings

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Questions

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